

REMARKS/ARGUMENTS

In response to the Office Action mailed September 21, 2005, Applicants amend their application and request reconsideration. In this Amendment claims 13-17 and 19-21 are cancelled leaving claims 12 and 18 pending.

Claim 12 has been amended to describe the pulsing of at least one of the pressure and flow rate of the treatment fluid in the closed processing cup. This feature is described in the patent application at page 9, lines 11-24.

Claim 18 has been rewritten in independent form without substantive change. The removal of redundant language in combining claims 12 and 18 as amended claim 18 does not constitute a substantive amendment of claim 18.

Applicants affirm their election of the species in response to the further requirement made by telephone. The amendment made here is entirely consistent with that conversation.

Claim 12 describes a process of treating a semiconductor wafer including blind holes within a processing cup. As explained in claim 12, at least one of the pressure and the flow rate of the treatment fluid, a liquid, is periodically and cyclically changed in pulses. In other words the pulsating pump that supplies the treatment fluid provides the fluid in a pulsed manner, not in a continuous flow. The patent application describes one example of the pump as being a bellows pump. As well known to those of skill in the art, as the bellows contracts and expands it pulses the fluid being pumped. As described in the patent application, this pulsating change in pressure and/or flow rate of the treatment fluid is effective in dislodging air bubbles that might otherwise remain within the blind holes. Therefore, the treatment fluid can completely enter the blind holes and clean or otherwise treat the interior surfaces of the those blind holes.

Claim 18 describes a process of treating a semiconductor wafer including blind holes by placing the semiconductor wafer in contact with the treatment fluid within a processing cup. As explained in this claim, the direction of flow of the treatment fluid within the processing cup is reversed periodically. This pattern of flow direction of the treatment fluid dislodges air bubbles that otherwise would remain within the blind holes

and prevent the treatment fluid from completely entering those blind holes and cleaning or otherwise treating the interior surfaces of those blind holes.

The examined claims, were rejected as unpatentable over Guldi et al. (U.S. Patent 5,698,040, hereinafter Guldi) considered by itself. This rejection is respectfully traversed.

Guldi describes a cleaning apparatus and cleaning method using a liquid for simultaneously cleaning a plurality of semiconductor wafers placed within a carrier. The apparatus includes two different sets of inlets for supplying the cleaning liquid to the carrier. One set of inlets provides a fluid flow tangential to the edges of the wafers, causing the wafers to rotate within the carrier. These fluid outlets are referred to as nozzles 11. Another set of inlets are referred to as recirculation jets 16 and two such jets are shown as present in the apparatus for supplying a liquid. According to the description in column 5 of Guldi, through the use of a valve 14, the liquid is alternatively switched between supply through the nozzles 11 and through the recirculation jets 16. The figures make clear that these inlets are, at best, transverse to each other in terms of the direction of introduction of the liquid into the cleaning tank 1.

In the apparatus described by Guldi and the operation of that apparatus, the pump 15 provides a steady flow of treatment liquid to the tank 1 to produce either a laminar or a turbulent flow. Whether the treatment fluid is provided through the nozzles 11 or the jets 16 depends upon the position of the valve 14. While the types of fluid flow produced at the outlets of the nozzles and the jets is different, i.e., laminar versus turbulent, there is no description of nor any apparatus for providing a pulsed fluid flow or pulsed pressure variations in the fluid pump in Guldi. Therefore, Guldi cannot suggest claim 12.

With regard to claim 18, according to the Office Action, the processing described in Guldi is “reversing direction of the processing fluid from nozzle means to laminar flow jet means”. That characterization is incorrect because it ignores the unambiguous meaning of the word “reversing”. There is never any reversal of flow with respect to either of the nozzles 11 or jets 16. Fluid only flows out of those nozzles or jets and does so alternatively. To be sure, changing the introduction of the liquid from the nozzles to the jets and vice versa alters the flow of the liquid within the described apparatus. However, there is no description in Guldi that any inlet, either of the nozzles or jets, is

ever used as an outlet, a necessary situation if flow in the tank is to be reversed. The Examiner pointed to particular passages of Guldi in making the rejection, but none of those passages describes or ever suggests that the inlets are sometimes outlets and vice versa.

Moreover, there is no suggestion in Guldi that such a reversal could or should occur. The pump 15 is unidirectional and always outputs liquid through the valve 14 either through the nozzles 11 or the jets 16. It is physically impossible in the description of Guldi to use the pump inlet 17 as the pump output. Further, even if the Guldi drawings are considered merely schematic, there is no description that would lead one to use the pump inlet 17 as an outlet.

An important feature of Guldi is the removal of particles from the semiconductor wafers and continuously moving the particles suspended in the liquid over the weir 9, as indicated by the arrows in Figure 3. If the direction of the flow of liquid were reversed, then the removed particles would be re-deposited on the wafers being cleaned, thwarting the very function of the apparatus and method described by Guldi. In fact, Guldi warns against various practices that would result in that re-deposition. Clearly, reversing flow so that the weir overflow does not occur is out of the question in Guldi.

The word “reverse” as used in the claims and in the patent application has a simple and unambiguous meaning, namely “opposite or contrary to a previous condition”. In the context of the invention, reversal means a change in flow direction in which the inlet becomes the outlet and the outlet becomes the inlet. Not only does Guldi fail to describe such a reversal, for all of the reasons described in the foregoing paragraphs, there can be no suggestion in Guldi for reversing the direction of flow, periodically or otherwise, of the treatment liquid. Thus, Guldi cannot possibly suggest the invention as defined by claim 18.

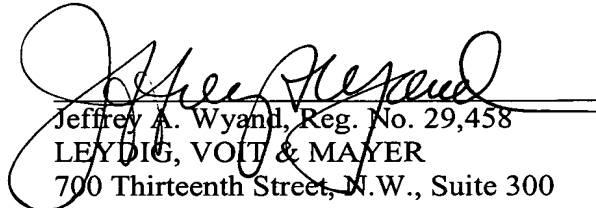
The Examiner acknowledged that Guldi is silent concerning the treatment of semiconductor wafers, mischaracterized as devices, having blind holes. The Examiner speculated that the semiconductor wafers must have blind holes. There is, by definition, no basis for such speculation. In any event, it is apparent that Guldi remained uninformed concerning the useful method of treating blind holes in semiconductor wafers and

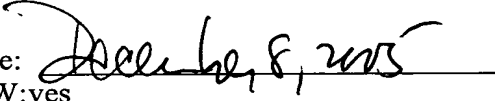
avoiding the problems of accumulated adherent air bubbles that solved in the invention.

Guldi simply cannot suggest the invention as defined by claim 18.

Upon reconsideration, claims 12 and 18 should be allowed.

Respectfully submitted,


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